

Inelastic X-ray Spectrometer at Advanced Photon Source for High Pressure Experiments

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Measurements of physical and dynamical properties of solids or liquids under pressure at high/low temperatures are important in understanding the behavior of materials. It is clear that any new methodology development will contribute greatly in solving some of the puzzles related to the structure of materials, whether this interest originates from a condensed matter physics, life science, mineral physics, or geology point of view.

The progress in measuring thermo-elastic properties using various inelastic x-ray scattering (IXS) techniques under such extreme conditions has lagged behind compare to the physical properties of materials. The atomic structure is addressed by x-ray diffraction, and great progress has been made in the last two decades in incorporating special structure diamond-anvil-cells (DAC) to synchrotron radiation beamlines.

Whereas, some progress has been made only in the last several years for studying dynamical properties of materials due to improved focusing optics and flux at the synchrotron radiation beamlines. In this presentation, experimental setup (coupled with externally heated/cooled DAC) and recent progress for momentum-resolved high energy resolution inelastic scattering (IXS) techniques at the Advanced Photon Source will be discussed within the scope of dynamical properties of materials at extreme conditions.

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